DOCUMENT RESUME

ED 233 790 PS 013 583

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TITLE The Role of Infant Cognitive Level in Mother-Infant Interaction.
PUB DATE Aug 82
NOTE 16p.; Paper presented at the Annual Meeting of the American Psychological Association (90th, Washington, DC, August 23-27, 1982).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Age; Developmental Disabilities; *High Risk Persons; Infant Behavior; *Infants; *Mental Age; Mothers; *Parent Child Relationship; Premature Infants; *Sex; Videotape Recordings
IDENTIFIERS *Parity; Social Interaction

ABSTRACT

Videotapes of mother/infant pairs were made to assess the influence of selected infant and maternal characteristics on parent/child interaction. Characteristics of interest were infant mental age, infant chronological age, infant gender, and parity. Subjects were 37 mothers (20 primiparous, 17 multiparous) and their infants (19 males, 18 females) who had been referred to an infant evaluation clinic due to suspected developmental delay; 14 had experienced premature delivery. Videotapes were approximately 5 minutes in duration and were usually of mothers seated in a rocking chair with infant in arms. Two independent observers using a 5-second time-sampling technique coded the tapes, noting the frequency with which mothers and infants engaged in tactile, vocal, and visual interactions. Subsequently, three dyadic measures were derived from the coded behaviors; each measure was determined within specific modalities. In particular, instances were identified in which (1) either or both partners were engaged in interaction during the same 5-second period, (2) mother and infant took turns within the same period, and (3) both partners were engaged in the same activity during a time frame. Among the results was the finding that infant mental age and chronological age exerted differential impact on interactions. Higher amounts of tactile and visual interaction were found in primiparous dyads than in multiparous dyads. In contrast to findings with normal infant samples, no gender effects were found. (RH)

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ED233790

The Role of Infant Cognitive Level in Mother-Infant Interaction

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PS 01 3583

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Paper presented at the annual meetings of the American Psychological Association, Washington, D. C., August 1982.

The Role of Infant Cognitive Level in Mother-Infant Interaction

Over the past twenty years an overwhelming amount of data has surfaced regarding the interactions of normal infants and their caregivers (e.g., Lewis & Rosenblum, 1974; Schaffer, 1977). In comparison, the mother-infant relationship in atypical infant populations has been delineated to a much lesser degree. This situation results primarily from two trends which have characterized the research efforts in this area. First, past investigators have typically focused upon variations in the interaction process as a function of the infant's specific handicapping condition, such as blindness (e.g., Fraiberg, 1974), autism (e.g., Kubicek, 1980) or Down's Syndrome (e.g., Buckhalt, Rutherford & Goldberg, 1978). While much valuable information has been provided by such research, the effects of other factors (e.g., infant age or gender) have not received adequate attention. Second, with few exceptions (e.g., Vietze, Falsey, O'Connor, Sandler, Sherrod & Altemeier, 1980) researchers have tended to examine only individual infant and maternal behaviors in addressing this issue; as such, the dyadic nature of the relationship between caregivers and their exceptional infants has gone virtually unexplored.

The purpose of the present study was to assess the influence of various infant and maternal characteristics upon interactional measures in a developmentally-delayed group of infants; these characteristics included infant cognitive level (as represented by mental age), infant chronological age, infant gender and parity. Comparisons between infant mental and chronological age were particularly of interest given the nature of the current infant sample. Specifically, the differential impact of these two factors cannot ordinarily be determined in normal infants samples in which mental and chronological age co-vary. However, because these age variables were unrelated in the present sample, this differential

impact could be assessed. In addition, infant gender and parity were included due to previous research which has implicated them in the interactions of mothers and normal infants (e.g., Lewis, 1972; Thoman, Barnett & Leiderman, 1971).

The sample for this study consisted of 37 mothers (20 primiparous, 17 multiparous) and their infants (19 males, 18 females) who had been referred to an infant evaluation clinic due to suspected developmental delay; 14 of the infants had experienced premature delivery. Infant chronological age (unadjusted for prematurity) ranged from 3-23½ months while mental age, as determined by the Bayley Scales of Infant Development (Bayley, 1969) varied from 1-12 months; in addition, all of the infants were essentially immobile. With respect to racial group membership, 88% were Caucasian, 11% were black and 1% were Mexican-American. Finally, in terms of socioeconomic status this sample was predominantly lower-middle and middle-class.

For the experimental procedure, each mother-infant pair was videotaped for approximately five minutes. These interactions were unstructured in that mothers were given no specific directions; in addition, no toys or other supporting objects were present during the taping. Throughout the session, infants maintained an alert, non-active state (Brazelton, 1973); in most cases, the mother was situated in a rocking chair with her infant in her arms. Subsequent to the videotapings, infants were given a comprehensive evaluation by the clinic staff; this evaluation included behavioral, psychomotor and neurological assessments.

In analyzing the videotapes, all filmed interactions were coded by two independent observers who, utilizing a 5-second time-sampling technique noted the frequency with which both mothers and infants engaged in tactile, vocal and visual interactions with each other. The specific behaviors which were coded and their definitions are included in Table 1. Reliability estimates were computed

by dividing the number of agreements regarding the occurrence of a target behavior by the total number of observations; these estimates exceeded .80 for each category for all subjects included in the data analyses.

Following the coding of the videotapes, dyadic measures were derived from the behaviors which had been coded. Specifically, the measures ON-TIME, ALTERNATION and CO-ACTION were established for each modality; definitions and examples of these measures are presented in Table 2.

For purposes of data analysis, percentages of time spent by the mother-infant pairs in alternation, co-action and on-time in each of the three modalities were computed and used as criteria in multiple regression analyses. In addition, estimates of total tactile, vocal and visual interaction were derived by summing the three interactional categories within each modality; these total measures were also used as criterion measures.

Preliminary analyses were performed in order to determine whether race, socio-economic status and maturity status (i.e., whether or not the infant had experienced a premature birth) significantly influenced the measures of interest. Because these analyses revealed significant contributions by each of these variables, it became necessary to control for them statistically. Following the recommendations of Cohen and Cohen (1975), these three factors were entered hierarchically on the first step of the regression analyses; then, for each criterion measure the following predictors were entered hierarchically in this order: Infant mental age, infant chronological age, infant gender and parity. In this way, the contributions of these four predictors could be assessed after race, socioeconomic status and maturity status had been taken into account. It should also be noted that correlational analyses were performed among all predictors in order to ensure that multicollinearity (i.e., relationships among the predictor

variables) did not exist; these analyses revealed that these predictors were not significantly related (i.e., $p > .05$).

The regression analyses revealed several significant findings. For example, infant mental age was found to influence tactile alternation, $F(1, 29) = 5.52$, $p < .05$; vocal alternation, $F(1, 29) = 4.30$, $p < .05$; and total tactile interaction, $F(1, 29) = 4.43$, $p < .05$. The nature of these effects is indicated in Table 3; as can be seen each of these interactional measures increased with increases in infant mental age.

Other significant findings included the emergence of infant chronological age as a predictor of tactile on-time, $F(1, 29) = 6.04$, $p < .05$; tactile co-action, $F(1, 29) = 4.40$, $p < .05$; vocal on-time, $F(1, 29) = 4.27$, $p < .05$; and total tactile interaction, $F(1, 29) = 4.42$, $p < .05$. As shown in Table 4, each of these measures was observed more frequently at higher levels of infant chronological age. In addition, parity was shown to contribute significantly to these criterion measures: Tactile on-time, $F(1, 29) = 8.30$, $p < .01$; and visual on-time, $F(1, 29) = 6.72$, $p < .05$. As Table 5 demonstrates, greater percentages of these interactions were observed in primiparous mother-infant pairs. Finally, in contrast to the other predictors, infant gender was not shown to significantly affect any of the criterion variables.

Because little information exists regarding the differential impact of infant mental age and infant chronological age upon the interaction process, a comparison of these two variables' effects assumes special importance in the present discussion. To a certain extent these effects were similar in that both mental age and chronological age were observed to influence tactile and vocal measures. Further, it is interesting that in the tactile modality the co-action and alternation measures in particular were affected. As noted in the earlier definitions

of these dyadic states, each requires participation by both the mother and the infant (in contrast to the on-time measure, which requires activity by only one partner). Therefore, these results indicate that more mutual/reciprocal tactile interaction took place at higher mental and chronological age levels.

However, differences also emerged between the two infant age variables; these differences included the fact that, except for total tactile interaction, mental and chronological age contributed significantly to different criterion measures. For example, in the vocal modality increases in chronological and mental age resulted in a higher occurrence of, respectively, on-time and alternation. In attempting to understand these findings it may be useful to refer to the work of Stern, Jaffe, Beebe and Bennett (1975). These authors, in discussing the various dyadic states which are possible when mothers and infants vocalize to each other, suggest that alternation is that state which is most essential for the emergence of conversation. It is possible, then, that the increase in vocal alternation observed in the present study between mothers and higher mental age infants reflected these infants' advanced language/communicative capacities (which were not necessarily present in the older infants).

These data regarding mental and chronological age are also important as they relate to previous research. For instance, in a comparison of Down's Syndrome and normal infants, Buckhalt et al. (1978) reported more vocalizations by both mothers and infants at higher mental age levels; such findings are consistent with the variations in vocal alternation observed in the current research as a function of infant mental age. Similarly, the increase in vocal on-time demonstrated by these mothers and their older infants integrates nicely with recent studies utilizing normal babies (e.g., Green, Gustafson & West, 1980). However, in contrast to the present results, prior studies with normal infants have tended to

report decreases in tactile contact with infant age (e.g., Crawley, Rogers, Friedman, Iaccobo, Criticos, Richardson & Thompson, 1978), primarily due to the increased mobility of these infants. A likely explanation for this discrepancy between the current and previous research involves the fact that the present sample of infants was essentially immobile.

In summarizing the results concerning infant mental age and chronological age, it would appear that these factors exerted differential impact upon the interactions of these mothers and their atypical infants. Obviously, such findings cannot be unconditionally generalized to normal infant populations. However, these results do offer tentative evidence that infant cognitive capacities have an impact upon the interaction process which is beyond, and different from, the contributions of infant chronological age. As such, it would seem necessary to consider both of these age variables when assessing the infant-caregiver relationship, particularly in developmentally-delayed infant populations.

Some final comments involve the findings concerning parity and infant gender. In considering the former, the higher amounts of tactile and visual interaction in primiparous as compared to multiparous dyads are very compatible with available data on normal mother-infant pairs. To illustrate, Lewis and Kreitzberg (1979) have reported that with increases in birth order mothers and infants tend to interact less in virtually every modality, including the tactile and visual modes.

In contrast, the failure of infant gender to significantly affect any measures in the present study is quite discrepant from research in normal infant samples; as indicated earlier, this factor appears to exert pervasive influence in such populations. In attempting to explain this absence of gender effects, it is possible that, in infant populations which are characterized by

developmental delay and/or other presenting problems, infant gender is simply not as salient a factor in the interaction process; in other words, the impact of this factor may be "over-ridden" by other considerations. Future research should examine this possibility by including infant gender in its analyses of interactions between mothers and atypical infants.

In conclusion, the current study has provided valuable information regarding the impact of various maternal and infant characteristics upon the mother-infant relationship in exceptional infant populations. One significant finding involved the emergence of infant mental age as a prominent factor in this relationship. Examining and documenting the role of this factor would seem to be important for several reasons. First, it is important theoretically in that it nicely illustrates the inter-relationship between the cognitive and affective systems in infant development. Second, this information could have wide-ranging implications for intervening in the interactions of exceptional infants and their caregivers. Given data which indicates that the quality of these interactions may subsequently have an impact on infant cognitive development (e.g., Beckwith, Cohen, Kopp, Parmelee & Marcy, 1976), the necessity for such intervention strategies would appear particularly critical.

Table 1

Coded Behaviors and Definitions

Behavior	Definition
Initiate	One partner begins a new interaction
Monitor	Mother or infant continues to sustain an interaction which he/she has initiated
Action	Either partner emits a behavior in response to a behavior of the other
Imitate	One partner duplicates the behavior of the other
Terminate	One partner ends an interaction
Off	Mother or infant continues to not take part in the interaction
Involuntary Initiate	Mother or infant accidentally begins an interaction
Involuntary Terminate	Mother or infant accidentally ends an interaction

Table 2

Derived Measures

Measure	Definition and Example
On-time	Either or both partners are engaged in interaction during the same 5-second time-frame (e.g., mother initiates a new tactile interaction while the infant is already monitoring tactilely)
Alternation	Mother and infant take turns within the same 5-second time-frame (as well as subsequent frames) (e.g., mother initiates vocally, infant emits vocal action, mother vocalizes again; any imitative sequence)
Co-action	Both partners are engaged in the same activity during a 5-second time frame (e.g., mother and infant are vocalizing simultaneously)

Note. Each of these derived measures were determined within specific modalities. Therefore, cross-modality measures were not derived.

Table 3

Interactional Measures by Infant Mental Age

Measure	Age(N) 2.0-4.0 mths. (N=18)	5.0-12.0 mths. (N=19)
Tactile Alternation	5%	10%
Vocal Alternation	11%	19%
Total Tactile Interaction	14%	24%

Table 4

Interactional Measures by Infant Chronological Age

Measure	Age(N) 3.0-11.0 mths. (N=18)	11.5-23.5 mths. (N=19)
Tactile On-time	1%	4%
Tactile Co-action	7%	11%
Vocal On-time	1%	4%
Total Tactile Interaction	15%	23%

Table 5

Interactional Measures by Parity

	Parity	
Measure	Primiparous	Multiparous
Tactile On-time	4%	1%
Visual On-time	10%	4.5%

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